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ORGANIC MANURE FERTILIZER AND GA SUBSTANCE AS AFFECTED THE PRODUCTIVITY OF COWPEA (*Vigna sinensis, L.*) PLANT.

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ABSTRACT

Two field experiments were carried out during the two successive seasons of 2000 and 2001 to study the effect of three rates of Nile compost (0,1 and 2 ton/fed.) with three rates of GA substance (0, 25 and 50 ppm) on growth, yield of cowpea and its some physical and chemical properties. The important obtained data are following:

1- Applying organic manure (Nile compost) at high rates (2 ton /fed.) resulted the highest values of growth characters, yield and its components and the contents of nutritional elements compared with the control treatment.
2- Addition of the external hormones GA_3 at 50 ppm obtained the best vegetative growth characters, the heaviest dry seeds yield (2.140 and 2.342 ton/fed. in the 1 st and 2 nd seasons), the highest values of total carbohydrate, total protein, the concentration of N, P, K, Fe, Mn, Zn and Cu.
3- The best growth characters, heaviest pods, dry seeds yield, average weight of 100 dry seeds as well as the outnumber of pods/plant the longest pod, the highest values of total carbohydrate, total protein, the concentration of N, P, K, Fe, Mn, Zn and Cu all of them were resulted from that plants received organic compost at the highest rate (2 ton /fed.) and addition of GA substance at concentration of 50 ppm.

INTRODUCTION

Cowpea (*Vigna sinensis, L.*) is one of the most important leguminous vegetable crops grown in Egypt serve as a good source of protein, and other nutrient. Organic fertilization is very important method of providing the plants with their nutritional requirements without having an undesirable impact on the environment. It is necessary to applicate of significant amounts of organic matter to improve physical and chemical conditions of the Egyptian soil particularly the newly ones. Therefore, organic can be used for this propose. The used of organic manures depend on its price in relation of this agronomic value, composition, environmental condition and the crop characteristics (Ali and Abdel-Mouty, 2000 and Rizk, 2002). For cowpea plants many investigators obtained resulted which supported using the organic fertilizers for vegetables. For example You and Duanwell, 1999; Ribeiro *et al.*, 2000 and Salama, 2002. all of them reported that, the vegetative plant growth responsed with the organic manures. Moreover, Negm *et al.*, 1998; Taufig and Sudaryono, 1998; You and Duanwell, 1999; Ouda, 2000, Ribeiro *et al.*, 2000 and Salama 2002 on tomato and pepper recorded that, the yield and its constituents of vegetable were associated with the addition of organic manure at different rates.

Gibberellic acid increased the plant height, yield, crude protein, total carbohydrate and p content (Zinson *et al.*, 1998; Bharat-Singh *et al.*, 1998; Deotale *et al.*, 1998; Sigh *et al.*, 1998; Prasad and Prasad, 1999 Carrera *et al.*, 2000 and Stolyarov, 2000).

The aim of this work was to study the effect of organic manure (Nile compost) mixed with growth regulators (GA substance) on growth, yield components and yield quality of cowpea plant.

MATERIALS AND METHODS

Two field experiments were carried out during the two successive growth seasons of 2000 and 2001 at the Experimental Station of the National Research Centre, Shalakan, Kalubia Governorat, to study the response of Cowpea plant to organic manure (Nile compost) and growth regulators(GA substance) on growth, yield components and yield quality. The chemical characteristics of the experiments soil are presented in Table (1), while chemical analysis of organic manure (Nile compost) is given in Table (2).

Table (1): Chemical analysis of the experimental soil 2000 and 2001 seasons.

Chemical analysis	2000	2001
Available K (mg/100g soil)	0.53	0.57
Available P (mg/100g soil)	5.44	6.31
Total nitrogen (mg/100g soil)	110.35	137.26
CL (meq/L.)	1.21	1.04
Co_3 (meq/L.)	3.12	3.76
Na_2 Co_3 (meq/L.)	3.19	3.41
Ca Co_3 (meq/L.)	2.20	2.38
Organic matter (%)	2.63	2.52
So_4 (ppm)	88.03	72.11
Ec (mmhos/cm/25°c)	1.78	1.83
pH	8.10	7.80

The experimental design used in the two growing seasons was a split – plot design with three replicates. The three rates of organic manure (Nile compost) were arranged at random in the main plots while, the three treatments of plant growth regulators were arranged within the sub- plot. Each sub-plot had an area of 14 m2 with three ridges/plot. In both seasons, seeds of cowpea (*Vigna sinensis, L.*) cv. Cream 7 were sown on March 26 and 18 of 2000 and 2001 seasons, respectively. The seeds were sown at 15 cm apart on one side of ridges and thinned to one plant per hill. The GA_3 mixed with Nile compost manure and the mixtures were added during preparing the soil for plantation. The normal cultural practices commonly used for cowpeas growing in the experimental site.

A random sample of 4 plants were taken from every experimental plot at 75 days old and plant height, average number of shoots and leaves, fresh and dry weight of whole plant and its shoots and leaves were recorded. At harvest time the weight of dry pods per plant and/or as ton/fed. were recorded.

Also samples of 20 pods from each experimental plot were taken for measure the average pod length, and for estimate the average weight of 100 dry seeds as g. Finally, samples of dry seeds were taken for chemical analysis, i. e N, P, and K contents according to the methods of Pregl (1945),

Troug and Mayer (1939) and Brown and Lilleland (1946), respectively. Also, Fe, Mn, Zn and cu contents were determined using flame ionization atomic absorption, spectrometer model 1100 B of Perkin Elemer and according to the method of Chapman and Pratt (1978). The protein percentage in dry seeds was accounted by multiplying nitrogen content by 6.25. However, total carbohydrate was determined according to A.O.A.C. (1975).

All the obtained data were statistically analyzed according to Gomez and Gomez (1984).

Table (2): The chemical analysis of the used Nile compost.

Character	Nile compost
pH	8.5
Ec (mmhos)	5
Organic carbon %	41
Organic matter %	70
Total nitrogen %	2
C/N ratio	1:17
Total phosphorous %	0.6
Total potassium %	1.2
Iron mg/kg	7900
Manganese mg/kg	190
Copper mg/kg	20
Zinc mg/kg	4.75

RESULTS AND DISCUSSION

A: Vegetative growth characters:

1-Effect of Nile compost:

Table (3) shows that additions of organic manure (compost produced from recycling the agricultural residues) for cowpea plant caused a promotion effect in plant growth characteristics. In addition with increasing the addition rate of Nile compost up to 2 ton /fed. resulted in the best values of plant growth. It means that, the vigor cowpea plant was associated with the addition of the highest rate of Nile compost. On the contrary, the poorest values were correlated with that plants no received Nile compost. These findings were true in both experimental seasons, i.e. 2000 and 2001.

It could be concluded that, in spite of that cowpea plant is one of the leguminacae which can fixed the atmospheric nitrogen through its bacterial nodes, but it needs to supply the soil by an external source of nitrogen such as organic one (Nile compost), hence this source cause a promotion for building the bacterial nodes on cowpea plant roots. This point were studied previously by many investigators such as Sangakkara *et al.*, 1999;You and Duanwell, 1999; Ouda, 2000; Ribeiro *et al.*, 2000 and Salama, 2002. All of them reported that, its necessary to supply leguminacae plant by nitrogen to increase the activity of bacterial nodes. They also reported that, organic materials improved soil structures as well as enriches the soil and stabilizes organic materials that otherwise might contribute to pollution of air, soil and water.

Table (3): Effect of organic manure and GA substance on growth of cowpea plant during two seasons (2000 and 2001).

A- First season.

Nile compost	GA_3	Plant height (cm)	No./plant		Fresh weight (g)			Dry weight (g)		
			Shoots	Leaves	Shoots	Leaves	Whole plant	Shoots	Leaves	Whole plant
Control	0	44.0	2.0	10.3	24.3	29.0	53.3	9.3	15.0	24.3
	GA_3(25 ppm)	48.3	3.0	16.3	41.7	73.7	115.3	15.7	15.3	31.0
	GA_3(50 ppm)	51.0	5.0	17.3	30.3	52.7	83.0	16.3	12.0	28.3
	Average	47.8	3.3	14.7	32.1	51.8	83.9	13.8	14.1	27.9
Nile compost (1ton/fed.)	0	50.3	3.7	15.3	47.7	52.1	99.7	11.0	21.3	32.3
	GA_3(25 ppm)	56.0	5.7	27.3	48.3	55.5	103.8	16.0	22.3	38.3
	GA3(50 ppm)	57.7	4.7	21.3	70.0	59.5	129.5	20.0	15.7	35.7
	Average	54.7	4.7	21.3	55.3	55.7	111.0	15.7	19.8	35.4
Nile compost (2ton/fed.)	0	51.3	4.3	12.0	36.0	46.7	82.7	12.0	16.7	28.7
	GA_3(25 ppm)	64.3	7.3	26.7	57.0	49.7	106.7	20.0	22.3	42.3
	GA_3(50 ppm)	67.0	5.0	36.3	75.0	76.7	151.7	23.3	21.7	45.0
	Average	60.9	5.6	25.0	56.0	57.7	113.7	18.4	20.2	38.7
Averages of growth regulators	0	48.6	3.3	12.6	36.0	42.6	78.6	10.8	17.7	28.4
	GA_3(25 ppm)	56.2	5.3	23.4	49.0	59.6	108.6	17.2	20.0	37.2
	GA_3(50 ppm)	58.6	4.9	25.0	58.4	62.9	121.4	19.9	16.4	36.3
L.S.D. at 5% level	Compost	3.6	1.3	7.2	13.4	14.4	21.6	3.3	3.9	5.0
	Growth	2.6	1.1	4.5	10.7	11.9	15.7	2.7	2.7	4.8
	Interaction	4.5	1.9	7.9	18.5	20.7	27.2	N.S.	4.7	N.S.

B- Second season.

Nile compost	GA_3	Plant height (cm)	No./plant		Fresh weight (g)			Dry weight (g)		
			Shoots	Leaves	Shoots	Leaves	Whole plant	Shoots	Leaves	Whole plant
Control	0	57.0	8.3	26.3	29.3	63.0	93.3	10.7	14.3	25.0
	GA_3(25 ppm)	61.6	8.3	35.3	43.3	71.7	115.0	16.7	14.7	31.3
	GA_3(50 ppm)	94.0	11.3	57.7	68.3	108.0	176.3	12.3	22.7	35.0
	Average	70.9	9.3	39.8	47.0	80.9	127.9	13.2	17.2	30.4
Nile compost (1ton/fed.)	0	93.1	10.3	37.3	60.0	75.0	135.0	13.7	15.0	28.7
	GA_3(25 ppm)	58.3	7.3	24.7	51.0	87.3	138.3	13.3	22.3	35.7
	GA3(50 ppm)	63.1	9.3	59.0	51.3	67.0	118.3	11.3	19.3	30.7
	Average	71.5	9.0	40.3	54.1	76.4	130.6	12.8	18.9	31.7
Nile compost (2ton/fed.)	0	80.7	10.7	41.7	58.0	99.0	157.0	10.3	18.0	28.3
	GA_3(25 ppm)	77.5	10.7	36.3	66.3	96.7	163.0	12.3	19.3	31.7
	GA_3(50 ppm)	90.2	13.3	81.0	45.3	115.7	161.0	13.3	23.7	37.0
	Average	82.8	11.6	53.0	56.6	103.8	160.3	12.0	20.3	32.3
Averages of growth regulators	0	76.9	9.8	35.1	49.1	79.0	128.1	11.6	15.8	27.3
	GA_3(25 ppm)	65.8	8.8	32.1	53.6	85.2	138.8	14.1	18.8	32.9
	GA_3(50 ppm)	82.4	11.3	65.9	55.0	96.9	151.9	12.3	21.9	34.2
L.S.D. at 5% level	Compost	7.5	1.0	5.6	7.4	N.S.	N.S.	N.S.	N.S.	N.S.
	Growth	13.2	1.3	5.9	N.S.	N.S.	N.S.	1.9	2.1	2.8
	Interaction	22.9	N.S.	10.3	26.6	25.3	35.1	3.4	3.6	4.8

2-Effect of GA substances:

The presented data in Table (3) indicates that treating cowpea plant by GA_3 as mixed it with organic fertilizer before sowing caused an enhancement in criteria of vegetative growth of cowpea plant if compared with the control plants. These results held good for all plant growth elements in two seasons. The obtained data also reveals that, the most favorable concentration of external application of GA substance for cowpea plant is 50 ppm. Whereas, using this concentration gave the most vigor plant growth compared to the control treatments. However, the variation within the

treatment of 50 ppm and control one were enough to reach the 5% level of significant with exception of fresh weight of whole plant and its organic in second season (2001).

It could be summarized that, the external application of GA substance increased the vegetative growth of cowpea plant if mixed with organic manure at 50 ppm.

The promotive effect of GA_3 on plant growth was confirmed by Clua *et al.*, 1997; Ogbonna and Abraham, 1989; Deotale *et al.*, 1998; Singh *et al.*, 1998 and Stolyarov, 2000. The present increase in plant height was partly to more height of the internodes and partly to the large number of elongated internodes than the untreated plants. This increase could be explained as GA_3 promotes cell elongation by increasing the plasticity of young cell wall and /or cell division (Salisbury and Rose, 1969).

3-Effect of the interaction treatments:

The interaction between organic manure (Nile compost) at different rates, i.e. 0,1 and 2 tons/fed. and the application of GA substances as a promotion growth regulators at 3 concentration, i.e. 0,25 and 50 ppm significantly affected the plant growth characters of cowpea plant in both seasons of 2000 and 2001. However, the best growth was resulted from that plants received organic compost at highest rate (2 tons/fed.) plus addition of GA substance at concentration of 50 ppm. whereas, these plants recorded the highest values of plant height, average number of shoots and leaves, fresh and dry weight of whole and its organs. These results are similar in experiments of 2000 and 2001.

B: Pods yield and its components:

1-Effect of Nile compost:

The obtained data (Table 4 and Fig. 1) demonstrated that, supplying cowpea plant by Nile compost as organic fertilizer increased the values of total pods yield and its different components compared to that plants no applied organic fertilizer. Moreover, the values of yield parameters increased to reach highest values with addition 2 tons/fed. These results were true in both two seasons. The heaviest tonnage per fed. of dry seeds of cowpea (2.364 and 2.592 for 1 st and 2 nd seasons) as well as the highest number of pods/ plant and the heaviest weight of 100 dry seeds all of them were associated with addition organic manure at rates of 2 tons/fed.

It is well known that, with increasing the rate of organic addition, the solubility and availability of macro and micro elements increase, hence the plant absorbed its requirements which reflect on plant growth and its yield. Also, it is worth to mentioned that, good effect of organic fertilizer in increasing leguminacae plant growth parameter may be mainly due to improving root rhizosphere condition, i.e. soil structure and moisture content (Awad, *et al.*, 1993). In addition, adding organic fertilizer had beneficial return to increase population of microorganism especially in the surface layer- root rihzosphere, that produce substances which stimulate plant growth.

Table (4): Effect of organic manure and GA substance on total pods yield and its components of cowpea plant during two seasons (2000 and 2001).

Nile compost	GA_3	2000						2001					
		Pod		Seeds		Yield (ton/fed.)		Pod		Seeds		Yield (ton/fed.)	
		Length	No/plant	No./Pod	Wt.100seeds	Pods	Seeds	Length	No/plant	No./Pod	Wt.100 seeds	Pods	Seeds
Control	0	13.2	13.1	5.5	15.0	1.347	0.907	13.1	11.5	5.2	15.6	1.203	0.993
	GA_3(25 ppm)	13.3	17.5	6.8	17.5	2.370	1.947	13.6	21.1	5.5	16.8	2.490	1.903
	GA_3(50 ppm)	13.5	13.7	7.4	18.3	2.557	1.697	13.8	19.6	6.2	18.9	2.847	2.003
	Average	13.3	14.8	6.6	16.9	2.091	1.517	13.5	17.4	5.6	17.1	2.180	1.633
Nile compost (1 ton/fed.)	0	13.1	15.4	7.2	16.4	2.853	1.910	14.0	13.3	6.3	17.0	1.383	1.203
	GA_3(25 ppm)	13.7	16.7	6.8	23.3	3.290	1.633	13.4	19.3	7.0	19.7	3.163	2.273
	GA3(50 ppm)	14.2	20.6	7.2	25.9	4.007	2.030	13.7	19.9	7.3	21.5	3.917	2.637
	Average	13.7	17.6	7.0	21.9	3.383	1.858	13.7	17.5	6.9	19.4	2.821	2.038
Nile compost (2 ton/fed.)	0	13.2	12.3	5.8	18.1	4.140	2.043	13.6	18.3	6.8	18.9	2.093	1.690
	GA_3(25 ppm)	14.6	18.4	7.3	24.5	4.237	2.343	14.0	21.3	7.7	22.0	4.120	2.850
	GA_3(50 ppm)	15.3	24.4	7.8	26.6	5.440	2.707	14.8	24.3	7.9	24.5	4.837	3.237
	Average	14.4	18.4	7.0	23.1	4.616	2.364	14.1	21.3	7.5	21.8	3.683	2.592
Averages of growth regulators	0	13.2	13.6	6.2	16.5	2.780	1.620	13.6	14.4	6.1	17.2	1.560	1.296
	GA_3(25 ppm)	13.9	17.5	6.9	21.8	3.299	1.974	13.7	20.6	6.7	19.5	3.258	2.342
	GA_3(50 ppm)	14.3	19.6	7.5	23.6	4.001	2.144	14.1	21.2	7.1	21.6	3.867	2.626
L.S.D. at 5% level	Compost	0.2	2.8	0.1	3.1	0.284	0.297	0.5	1.0	0.4	1.5	0.192	0.200
	Growth	0.3	3.2	0.6	1.6	0.276	0.284	N.S.	1.6	0.3	0.6	0.279	0.135
	Interaction	0.5	5.6	1.0	2.8	0.479	0.491	N.S.	2.9	N.S.	1.1	0.483	0.233

Other investigators had a good accordance of the obtained data (You and Duanwel 1999; Kandasawy *et al.*, 2000; Karmegam and Daniel 2000; Ouda 2000; Ribeiro *et al.*, 2000 and Salama, 2002).

2-Effect of GA substances:

During the experimental seasons of 2000 and 2001, the obtained data (Table 4 and Fig. 2) concerning to the effect of GA_3 application on the pods yield and its components reveals that plants received GA substance recorded heavier pods yield, longer pods, outnumber pods per plant as well as the heavier weight of 100 dry seeds if compared to the control treatment. Moreover, with increasing the concentration of GA substance resulted in the highest values of the previous parameters. These results held well in the two experimental seasons. It could be concluded that, the heaviest dry seeds yield (2.144 and 2.342 tons/fed. In 1st and 2 nd seasons) were harvested from that cowpea plants applied by GA_3 at concentration of 50 ppm. The statistical analysis of the obtained data indicate that, the variation within the 3 treatments of GA substances were enough to reach 5% level of significant. These were true in both experiments for pods yield and its components, except the length of pod in 2nd season.

Generally, the obtained data are in good accordance with that of Singh and Sharma, 1996 who found that the highest seed yields of cowpea (1.19 and 1.32 ton/ ha.) were obtained with 40 ppm (GA_3). Other investigators had a good accordance of the obtained data (Bhat and Singh, 1997; Bharat-Singh *et al.*, 1998; Deotale *et al.*, 1998; Sigh *et al.*, 1998; Carrera *et al.*, 2000 and Stolyarov, 2000).

3-Effect of the interaction treatments:

The interaction within organic manure and GA substance treatments had a statistically significant effect on the pods yield and its components of cowpea (Table 4 and Fig. 3). These were true in two experimental seasons for average number of pods/plant, weight of 100 dry seeds, weight of pods as well as weight of dry seeds as tons/fed. Generally, the heaviest pods yield, dry seeds yield, average weight of 100 dry seeds, the outnumbered of pods /plant as well as the longest pod all of them were resulted when cowpea plant received 2 tons/ fed. of Nile compost and 50 ppm of GA substances. These results were true in experiments of 2000 and 2001.

C: Nutritional values of dry seeds yield:

1-Effect of Nile compost:

Table (5) shows clearly that the content of total carbohydrate, total protein, as well as nutritional elements (N, P, K, Fe, Mn, Zn and Cu) in tissues of seeds yield increased with addition Nile compost if compared with that plants no received Nile compost (control). In addition the increasing rate of Nile compost, the content of the previous nutritional values increased. It means that the highest percentage of total carbohydrate and total protein were associated with supplying 2 tons/fed. of Nile compost. The behavior of N, P and K as major elements as well as Fe, Mn, Zn and Cu as micro elements followed the same order of change like total carbohydrates and /or total protein.

Table (5): Effect of organic manure and GA substance on the nutritional values of cowpea yield during two seasons (2000 and 2001).

A-First season.

Nile compost	GA_3	Carbo-hydrate	Protein	%			ppm			
				N	P	K	Fe	Mn	Zn	Cu
Control	0	29.83	20.38	3.26	0.432	2.107	5.97	0.171	0.151	0.130
	GA_3(25 ppm)	30.00	20.02	3.20	0.440	2.267	6.59	0.196	0.194	0.146
	GA_3(50 ppm)	30.20	23.54	3.77	0.472	2.330	7.20	0.210	0.204	0.162
	Average	30.01	21.31	3.41	0.448	2.234	6.59	0.192	0.183	0.150
Nile compost (1ton/fed.)	0	30.03	20.69	3.31	0.459	2.413	7.49	0.185	0.161	0.175
	GA_3(25 ppm)	30.17	24.75	3.96	0.473	2.333	7.46	0.224	0.203	0.191
	GA3(50 ppm)	31.10	27.23	4.36	0.491	2.443	7.87	0.235	0.212	0.214
	Average	30.43	24.22	3.88	0.474	2.397	7.61	0.215	0.192	0.190
Nile compost (2 ton/fed.)	0	30.33	21.00	3.36	0.449	2.390	8.01	0.202	0.177	0.202
	GA_3(25 ppm)	32.17	28.17	4.51	0.527	2.430	8.06	0.243	0.219	0.219
	GA_3(50 ppm)	32.53	30.15	4.82	0.539	2.507	8.72	0.256	0.238	0.235
	Average	31.67	26.44	4.23	0.505	2.442	8.26	0.234	0.211	0.220
Averages of growth regulators	0	30.06	20.69	3.31	0.446	2.303	7.15	0.185	0.163	0.169
	GA_3(25 ppm)	30.78	24.31	3.89	0.480	2.343	7.37	0.221	0.205	0.185
	GA_3(50 ppm)	32.28	26.97	4.32	0.501	2.427	7.93	0.234	0.218	0.203
L.S.D. at 5% level	Compost	0.51	3.69	0.59	0.032	0.036	0.85	0.007	0.011	0.003
	Growth	0.43	1.88	0.30	0.015	0.037	0.33	0.008	0.008	0.005
	Interaction	0.74	3.25	0.52	0.027	0.063	N.S.	N.S.	N.S.	N.S.

B-Second season.

Nile compost	GA_3	Carboh-ydrate	Protein	%			ppm			
				N	P	K	Fe	Mn	Zn	Cu
Control	0	29.27	19.48	3.12	0.439	2.080	6.13	0.166	0.152	0.122
	GA_3(25 ppm)	29.77	20.10	3.22	0.485	2.237	6.86	0.202	0.198	0.136
	GA_3(50 ppm)	30.10	26.69	4.27	0.483	2.280	7.17	0.209	0.207	0.154
	Average	29.71	22.09	3.53	0.469	2.199	6.73	0.192	0.186	0.137
Nile compost (1 ton/fed.)	0	30.10	22.79	3.65	0.445	2.180	6.32	0.177	0.179	0.135
	GA_3(25 ppm)	30.43	26.42	4.23	0.506	2.337	7.50	0.214	0.210	0.184
	GA3(50 ppm)	31.13	26.42	4.23	0.513	2.480	7.72	0.226	0.214	0.202
	Average	30.56	25.21	4.03	0.468	2.332	7.18	0.206	0.201	0.174
Nile compost (2 ton/fed.)	0	30.00	25.88	4.14	0.462	2.250	6.35	0.206	0.177	0.159
	GA_3(25 ppm)	31.50	26.58	4.25	0.548	2.523	8.08	0.230	0.228	0.217
	GA_3(50 ppm)	32.87	32.38	5.18	0.588	2.537	8.70	0.254	0.240	0.235
	Average	31.46	28.28	4.52	0.533	2.437	7.71	0.230	0.215	0.204
Averages of growth regulators	0	29.79	22.72	3.63	0.448	2.170	6.27	0.183	0.169	0.139
	GA_3(25 ppm)	30.57	24.37	3.90	0.513	2.366	7.49	0.215	0.212	0.179
	GA_3(50 ppm)	31.37	28.49	4.56	0.528	2.432	7.86	0.230	0.221	0.197
L.S.D. at 5% level	Compost	0.38	1.89	0.30	0.013	0.145	0.34	0.006	0.015	0.007
	Growth	0.43	1.74	0.28	0.014	0.064	0.26	0.006	0.011	0.008
	Interaction	0.74	3.01	0.48	0.025	N.S.	0.45	N.S.	N.S.	0.013

Generally, applying the organic manure at high rate, i.e. 2 tons/fed. of Nile compost gave the highest contents of nutritional elements. This effect could be resulted from the increase elements in the soil at rooting zone, consequently the uptake of these elements increased in plant tissues.

The role of the organic fertilizer for increasing the nutritional values were investigated by many works (Gowda *et al.*, 1998; Negm *et al.*, 1998; Olayinka *et al.*, 1998; Xu *et al.*, 2000 and Salama 2002).

2-Effect of GA substances:

Addition of GA substances in growing media of cowpea plant as mixing it with organic manure had a statistical significant effect on nutritional values of dry seeds compared with the control treatment in the two experimental seasons (Table, 5). Moreover, the total carbohydrate, total protein, the concentration of N, P, K, Fe, Mn, Zn and Cu, their highest values

were associated with addition of 50 ppm of GA substances. These findings held well in experiment of 2000 and 2001. It known that GA_3 is a promotion hormone, caused an increase in vegetative growth, i.e. leaves area, plant height, number of leaves and weight of whole plant as well as enhancing the processes of photosynthesis and lastly increased the accumulation of feeding elements in the storage organ, i.e. pods and seeds of cowpea. Many investigators had the same trend of that results which obtained here (Clua *et al.*, 1997 and Prasad and Prasad, 1999) who reported that GA_3 significantly increased protein content, carbohydrate and some nutritional elements in plant tissues.

3-Effect of the interactions treatment:

The interaction treatments of organic manure (Nile compost) at rates of 0,1 and 2 tons/fed. with addition GA substances at concentration of 0,25 and 50 ppm had a slight significant effect on some nutritional values of cowpea seeds (Table 5). However, only total carbohydrate, total protein, N and P (in the two seasons) as well as K in 1 st season and Cu in 2 nd only all of them significantly responsed to the mixture of organic and GA substances.

Generally at different rates of organic fertilizer, addition GA substances resulted in an increase in the nutritional parameters. By other means, the highest values of total carbohydrate, total protein, N, P, K, Fe, Mn, Zn and Cu were recorded in yield of that plants supplied Nile compost at 2 ton/fed. and GA substance at concentration of 50 ppm. These findings are in good accordance in the two experimental seasons.

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تأثير السماد العضوي و الجبرلين على إنتاجية نبات اللوبيا

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أجريت تجربتان حقليتان بمزرعة المركزالقومى للبحوث في عـــامي ٢٠٠٠و ٢٠٠١ لدراســة تأثير استخدام السماد العضوي (كمبوست النيل) تحت ثلاثة معدلات للإضافــة (صفــر، ١ ،٢ طن/ف) مع إضافة حامض الجبر لين إلى السماد العضوي بثلاثة مستويات (صفـــر، ٢٥ ،٥٠ جزء في المليون) على صفات النمو والمحصول والجودة وكذلك محتوى البذور الجافــة مــن الكربوهيدرات الكلية و البروتين و النيتروجين والفوسفور و البوتاســيوم و الحديــد و الزنــك والمنجنيز و النحاس . و تضمنت أهم نتائج الدراسة مايلى :

١-أدى استخدام السماد العضوي (كمبوست النيل) بمعدل ٢ طن/ف إلى الحصول على افضـــل صفات للنمو الخضري و افضل كمية محصول و كذلك افضل صفات طبيعية للبذور و أعلـــى محتوى كيماوي للبذور الجافة.

٢-إضافة حامض الجبر لين بمعدل ٥٠ جزء في المليون أدى إلى زيادة صفات النمو الخضري و كذلك أعلي وزن محصول بذور جافة (٢,١٤٠ , ٢,٣٤٢ طن/ف للسنة الأولـــى و الثانيــة على التوالي) وكذلك أعلي قيم للكربوهيدرات الكلية و البروتين الكلي و النيتروجين والفوسفور و البوتاسيوم و الحديد و الزنك والمنجنيز و النحاس.

٣-سجلت افضل صفات للنمو الخضري و أعلى محصول للقرون أوالبذور الجافة و متوسط وزن ١٠٠ بذرة جافة وعدد القرون على النبات و أيضـــا أعلـــى محتـــوى للبـــذور الجافـــة مـــن الكربوهيدرات الكلية و البروتين الكلي و عناصر النيتروجين والفوسفور و البوتاسيوم و الحديــد و الزنك والمنجنيز و النحاس عند إضافة سماد كمبوست النيل بمعـــدل ٢ طـــن/ف و إضافـــة حامض الجبر لين بمعدل ٥٠ جزء في المليون.